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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/544,822

Filing Date: April 06, 2000

Appellant(s): JIANG, TONGBI

James R. Duzan
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5-23-7 appealing from the Office action mailed 10-20-6.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

Appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

Appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,959,363	YAMADA	9-1999
6,350,840	SCHULTZ	2-2002
4,961,967	PLUDEMANN	10-1990
4,231,910	PLUEDDEMANN	11-1980
6,303,277	HIEDA	10-2001
5,766,982	AKRAM	6-1998
5,203,076	BANERJI	4-1993

(9) Grounds of Rejection

In the rejections infra, generally, reference labels are recited only for the first recitation of identical claim elements.

The following grounds of rejection are applicable to the appealed claims:

Claims 58-61 stand rejected under 35 U.S.C. 102(e) as being clearly anticipated by Yamada (5959363).

At column 56, line 12 to column 58, line 24, Yamada discloses the following:

A method for attaching a semiconductor assembly, said method comprising: providing a semiconductor device 201 having an active surface; providing a substrate 202 having an upper surface; applying a liquid wetting agent layer 205 to one of said active surface of said semiconductor device and said upper surface of said substrate; connecting said semiconductor device to said substrate so that said active surface of said semiconductor device faces said upper surface of said substrate; and applying a flowable underfill material 206 between the substrate and the semiconductor device, such that said flowable underfill material contacts said applied wetting agent layer "coupling agent"; wherein applying said wetting agent layer comprises a dispensing "screen printing" method; wherein said wetting agent layer comprises at least one layer; wherein said wetting agent layer comprises a silane-based material "silane."

To further clarify the disclosure of a liquid wetting agent layer 205, as cited, Yamada discloses "these components being . . . molten . . . was coated on surface of the wiring circuit board . . . thereby forming a second encapsulation resin layer 205." Furthermore, Yamada discloses "The coating method of this second encapsulation resin [205] may be arbitrarily selected." In addition, as cited, Yamada discloses that the disclosure that a coating method of "encapsulation resin may be arbitrarily selected" includes

"screen printing," and, screen printing of encapsulation resin inherently requires liquid encapsulation resin.

Claims 1-5, 7-12, 15, 22, 62 and 64 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yamada (5959363), Schultz (6350840) and Pluddemann (4961967).

At column 53, line 66 to column 56, line 11; and column 59, line 34 to column 60, line 53, Yamada discloses the following:

A method for applying a material between a semiconductor device having a surface and a substrate having a surface, said method comprising: applying a liquid wetting agent layer to one of said surface of said semiconductor device and said surface of said substrate; and applying a flowable underfill material between the substrate and the semiconductor device, such that said flowable material contacts said wetting agent layer; wherein said semiconductor device is attached to said substrate; wherein said applying said liquid wetting agent layer comprises a dispensing method; wherein said liquid wetting agent layer comprises at least one layer; wherein said liquid wetting agent layer comprises a plurality of layers; wherein said applying a liquid wetting agent layer comprises providing a material that to the surface of one of said surface of said semiconductor device and said surface of said substrate for the application of an underfill material.

A method for applying a material between a semiconductor device and a substrate, said method comprising: providing a semiconductor device having an active surface, another surface, a first end, a second end, a first lateral side, and a second lateral side, said first end, said second end, said first lateral side, and said second lateral side forming at least a portion of a periphery of said semiconductor device; providing a substrate having an upper surface, a first side wall, a second side wall, a first lateral side wall and a second lateral side wall; applying a liquid wetting agent layer to one of said active surface of said semiconductor device and said upper surface of said substrate; and applying a flowable underfill material between said semiconductor device and said substrate, such that said flowable material contacts said applied wetting agent layer; wherein said flowable material is applied substantially adjacent to at least one end of said semiconductor device; wherein said flowable material substantially fills a gap between said semiconductor device and said substrate; wherein said flowable material is provided substantially adjacent to said at least a portion of the periphery of said semiconductor device to fill a gap between said substrate and said semiconductor device; wherein said applying said flowable material comprises: providing said flowable material substantially adjacent said first end of said semiconductor device for filling between said substrate and said

semiconductor device by one or more forces acting upon said flowable material.

A method for attaching a semiconductor assembly, said method comprising: providing a semiconductor device having an active surface, a first end, a second end, a first lateral side end and a second lateral side end; providing a substrate having an upper surface, a first side wall, a second side wall, a first lateral side wall and a second lateral side wall; applying a silane-comprising material layer to one of a portion of said active surface of said semiconductor device and a portion of said upper surface of said substrate; connecting said semiconductor device to said substrate so that said active surface of said semiconductor device faces said upper surface of said substrate; and applying a flowable underfill material between said semiconductor device and said substrate, such that said flowable underfill material contacts said applied silane-comprising material layer.

A method for applying a material between a semiconductor device having a surface and a substrate having a surface, said semiconductor device mounted on said substrate, said method comprising: applying a essentially uniform liquid silane-comprising wetting agent layer inherently having a total thickness to at least one of said surface of said semiconductor device and said surface of said substrate; and applying a flowable underfill material between the substrate and the semiconductor device separately

from said liquid silane-comprising wetting agent layer, such that said flowable material contacts said wetting agent layer.

To further clarify, Yamada discloses wherein said liquid wetting agent layer comprises a plurality of layers because, as cited, Yamada discloses, "205, a second resin constituting a laminate of encapsulation resin," and, "a second encapsulation resin layer 205," and, "it is well settled that the term 'a' or 'an' ordinarily means 'one or more'." *Tate Access Floors, Inc., and Tate Access Floors Leasing, Inc., v. Interface Architectural Resources, Inc.*, 279 F.3d 1357; 2002 U.S. App. LEXIS 1924; 61 U.S.P.Q.2D (BNA) 1647 ((citing *Tate Access Floors, Inc. v. Maxcess Techs., Inc*, 222 F.3d 958, 966 n.4, 55 U.S.P.Q.2D (BNA) 1513, 1518 [**32] (citing *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977, 52 U.S.P.Q.2D (BNA) 1109, 1112 (Fed. Cir. 1999): "As we have previously explained, it is generally accepted in patent parlance that 'a' or 'an' can mean 'one or more'.")). And, "This court has repeatedly emphasized that an indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.' Unless the claim is specific as to the number of elements, the article 'a' receives a singular interpretation only in rare circumstances when the patentee evinces a clear intent to so limit the article." (Citations omitted). *Scanner Technologies v./COS Vision Systems*, 365 F.3d 1299, 1304 (Fed. Cir. 2004).

However, Yamada does not appear to explicitly disclose the particular claimed layer thickness.

Notwithstanding, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose this particular thickness because appellant has not disclosed that, in view of the applied prior art, the thickness is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical. For that matter, appellant has not disclosed that the thickness is for **any** purpose or produces **any** result. Moreover, it appears *prima facie* that the process would possess utility using another thickness. Indeed, it has been held that mere dimensional limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007); *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Also, Yamada does not appear to explicitly disclose that the underfill material is a thermoplastic material.

Nevertheless, as cited, Yamada discloses that the underfill material is a thermosetting material, and that, as disclosed at column 70, lines 8-14 and 56-67 (claim 1), the underfill material is not limited to thermosetting material. In addition, at column 1, line 32 to column 4, line 63, Schultz discloses a thermoplastic underfill material that is superior to thermosetting underfill material. Hence, although the claims are not limited to a thermoplastic underfill material, it would have been obvious to combine this disclosure of Schultz with the disclosure of Yamada because it would provide a reworkable underfill that is superior to the thermosetting underfill of Yamada.

Also, Yamada and Schultz do not appear to explicitly disclose that said flowable material contacts said liquid wetting agent layer; wherein said liquid wetting agent layer includes a layer of silane-based (defined as a silane main [chief, principle] ingredient) material; said flowable material contacts said applied liquid wetting agent layer; and a silane-based wetting agent layer. Regardless, as cited, Yamada discloses that "other adhesion assistants [wetting agent layers] may also be coated." Also, at column 1, third full paragraph, Pluddemann discloses (in Plueddemann (4231910), incorporated by reference, at column 1, lines 5-8, 21-23 and 55-63; column 2, lines 5-49; column 3, lines 22-54; column 3, line 65 to column 4, line 10; column 4, lines 24-27 and 58-62; column 6, lines 11-19, 37-44 and 57-65; and column

7, line 4 to column 8, line 5) that a flowable material contacts a liquid wetting agent layer; wherein the liquid wetting agent layer includes a layer of silane-based material; and a silane-based wetting agent layer. In addition, it would have been obvious to combine this disclosure of Pluddemann with the disclosure of the combination of Yamada and Schultz because it would provide the "other adhesion assistants" of Yamada having improved wetting to the thermoplastic underfill material of Yamada and Schultz. Furthermore, the wetting agent layers of Pluddemann and the combination of Yamada and Schultz, including the "other adhesion assistants" of Yamada in the combination of Yamada and Shultz, are at least alternatives; therefore, as reasoned from well established legal precedent, it would have been obvious to substitute or combine the liquid wetting agent layer of Pluddemann for or with the wetting agent layer of Yamada in the combination of Yamada and Schultz. See *In re May* (CCPA) 136 USPQ 208 (It is our opinion that the substitution of Wille's type seal for the cement of Hallauer in Figure 1 would be obvious to persons of ordinary skill in the art from the disclosures of these references, merely involving an obvious selection between known alternatives in the art and the application of routine technical skills.); *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007); *In re Cornish* (CCPA) 125 USPQ 413; *In re Soucy* (CCPA) 153 USPQ 816; *Sabel et al. v. The Wickes Corporation et al.* (DC SC) 175

USPQ 3; Ex parte Seiko Koko Kabushiki Kaisha Co. (BdPatApp&Int) 225 USPQ 1260; and Ex parte Rachlin (BdPatApp&Int) 151 USPQ 56. See also Smith v. Hayashi, 209 USPQ 754 (Bd. of Pat. Inter. 1980) (However, there was evidence that both phthalocyanine and selenium were known photoconductors in the art of electrophotography. "This, in our view, presents strong evidence of obviousness in substituting one for the other in an electrophotographic environment as a photoconductor." 209 USPQ at 759.). An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. In re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted). "For example, where a claimed apparatus requiring Phillips head screws differs from a prior art apparatus describing the use of flathead screws, it might be hard to find motivation to substitute flathead screws with Phillips head screws to arrive at the claimed invention. However, the prior art would make it more than clear that Phillips head screws and flathead screws are viable alternatives serving the same

purpose. Hence, the prior art would 'suggest' substitution of flathead screws for Phillips head screws albeit the prior art might not 'motivate' use of Phillips head screws in place of flathead screws. *Ex parte Jones*, 62 USPQ2d 1206 (BdPatApp&Int 2001). See also *In re Crockett*, 279 F.2d 274, 126 USPQ 186 (CCPA 1960); *Ex parte Quadranti*, 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992).

In the alternative, claim 64 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada, Schultz and Pluddemann as applied to claim 64 *supra*, and further in combination with Hieda (6303277).

Yamada does not appear to disclose literally the layer 205 having a thickness of about a monolayer.

Nonetheless, at column 3, line 64 to column 4, line 5; and column 5, lines 41-51, Hieda discloses literally a layer 2 having a thickness of about a monolayer. Furthermore, it would have been obvious to combine this disclosure of Hieda with the disclosure of the applied prior art because it would enable obtainment of a high resolution layer pattern.

Claim 63 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada as applied to claim 61, and further in combination with Schultz (6350840) and Pluddemann (4961967).

Yamada does not appear to explicitly disclose that the underfill material is a thermoplastic material.

Nevertheless, as cited, Yamada discloses that the underfill material is a thermosetting material, and that, as disclosed at column 70, lines 8-14 and 56-67 (claim 1), the underfill material is not limited to thermosetting material. In addition, at column 1, line 32 to column 4, line 63, Schultz discloses a thermoplastic underfill material that is superior to thermosetting underfill material. Hence, it would have been obvious to combine this disclosure of Schultz with the disclosure of Yamada because it would provide a reworkable underfill that is superior to the thermosetting underfill of Yamada.

Also, Yamada and Schultz do not appear to explicitly disclose wherein said liquid wetting agent layer comprises one of glycidoxypropyltrimethoxysilane and ethyltrimethoxysilane.

Regardless, as cited, Yamada discloses that "other adhesion assistants [wetting agent layers] may also be coated." Also, as cited *supra*, Pluddemann discloses wherein a liquid wetting agent layer comprises one of glycidoxypropyltrimethoxysilane and ethyltrimethoxysilane. In addition, it would have been obvious to combine this disclosure of Pluddemann with the disclosure of Yamada and Schultz because it would provide the "other adhesion assistants" of Yamada having improved wetting to the thermoplastic underfill material of Yamada and Schultz.

Furthermore, the wetting agent layers of Pluddemann and Yamada, including the "other adhesion assistants" of Yamada, are at least alternatives; therefore, as reasoned from well established legal precedent, it would have been obvious to substitute or combine the liquid wetting agent layer of Pluddemann for or with the wetting agent layer of Yamada.

Claims 13, 14, 16-21 and 23-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada, Schultz and Pluddemann as applied to claim 10, and further in combination with Akram (5766982).

Yamada, Schultz and Pluddemann do not appear to explicitly disclose the following:

The method wherein said substrate includes an aperture extending through said substrate; wherein said aperture is located adjacent to said another surface of said semiconductor device, further comprising: elevating at least said first side wall of said substrate and said first end of said semiconductor device; wherein said elevating said first side wall of said substrate comprises placing said substrate on a support structure and elevating at least one portion of said support structure, further comprising: providing a dam on the substrate adjacent to at least one of said first end, said second end, said first lateral side and said second lateral side of said semiconductor device; wherein said dam extends to substantially between said semiconductor device and said substrate, further comprising: vibrating

one of said semiconductor device and said substrate; wherein said vibrating one of said semiconductor device and said substrate comprises placing said substrate on a support structure and vibrating said support structure; wherein said substrate includes at least one aperture extending through said substrate and substantially located adjacent to said another surface of said semiconductor device; wherein said flowable material is provided through said at least one aperture of said substrate substantially filling a gap between said substrate and said semiconductor device; wherein said substrate includes at least one aperture extending therethrough and substantially located adjacent to said another surface of said semiconductor device; wherein said flowable material is provided from below said substrate; and wherein said flowable material is provided through said at least one aperture contacting at least a portion of said another surface of said semiconductor device.

Nevertheless, at column 4, line 36 to column 7, line 17, Akram discloses a process wherein a substrate 10 includes an aperture extending through a substrate, an aperture 60 is located adjacent (nearby) to another surface of a semiconductor device 12; elevating at least a first side wall of the substrate and a first end of the semiconductor device; wherein elevating a first side wall of the substrate comprises placing the substrate on a support structure 44 and elevating at least one portion of a support

structure; providing a dam 40 on the substrate adjacent to at least one of a first end, a second end, a first lateral side and a second lateral side of a semiconductor device; wherein a dam extends to substantially between a semiconductor device and a substrate; vibrating 48 one of a semiconductor device and a substrate; wherein vibrating one of a semiconductor device and a substrate comprises placing a substrate on a support structure and vibrating a support structure; wherein a flowable material 28 is provided through at least one aperture of a substrate substantially filling a gap 26 between a substrate and a semiconductor device; wherein the flowable material is provided from below the substrate; and wherein a flowable material is provided through at least one aperture contacting (at least indirectly physically and thermally contacting) at least a portion of another surface of a semiconductor device. Moreover, it would have been obvious to combine this disclosure of Akram with the disclosure of the applied prior art because it would facilitate applying the flowable material 206 between the substrate and the semiconductor device.

Also, in the combination, Yamada discloses the method wherein applying a flowable material comprises: providing the flowable material substantially adjacent to the first end of the semiconductor device for filling the gap between the substrate and the semiconductor device; wherein said applying said flowable material comprises: providing said flowable material

substantially adjacent to said first end and one of said first lateral side and said second lateral side of said semiconductor device for filling the gap between said substrate and said semiconductor device.

Claims 31 and 32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada, Shultz and Pluddemann as applied to claim 10, and further in combination with Banerji (5203076).

Yamada, Shultz and Pluddemann do not appear to explicitly disclose wherein said applying said flowable material between said semiconductor device and said substrate further comprises placing said semiconductor device and said substrate in a chamber, said chamber having an atmosphere therein having a variable pressure, further comprising: varying the pressure of said atmosphere in said chamber for said flowable material substantially filling a gap between said semiconductor device and said substrate.

Regardless, at column 2, lines 55-68; and column 3, lines 1-10, Banerji discloses wherein applying a flowable material 22 between a semiconductor device 10 and a substrate 20 comprises placing the semiconductor device and the substrate in a chamber 32 having an atmosphere therein having a variable pressure, and varying the pressure of the atmosphere in the chamber for the flowable material substantially filling a gap 18 between the semiconductor device and the substrate.

Furthermore, it would have been obvious to combine this disclosure of

Banerji with the disclosure Yamada, Pluddemann and Shultz because it would facilitate applying the flowable material 206 between the substrate and the semiconductor device.

(10) Response to Argument

Appellant states, "Appellant asserts that the Yamada et al. reference does not identically describe, either expressly or inherently, the elements of the presently claimed invention of independent claim 58 calling for 'applying a liquid wetting agent layer to one of said active surface of said semiconductor device and said upper surface of said substrate' and 'applying a flowable underfill material between the substrate and the semiconductor device, such that said flowable underfill material contacts said applied wetting agent layer.' In contrast to the elements of the presently claimed invention of independent claim 58, the Yamada et al. reference describes the use of a wax layer. Appellant asserts that the Yamada et al. wax layer is not a 'liquid wetting agent layer' as recited in claim 58."

These statements are respectfully deemed unpersuasive and are traversed because Yamada is not limited to a disclosure of the use of a wax layer and Yamada is not necessarily relied on for a disclosure that a wax layer is a liquid wetting agent layer. In any case, as elucidated in the rejection, Yamada discloses "connecting said semiconductor device to said substrate so that said active surface of said semiconductor device faces said

upper surface of said substrate; and applying a flowable underfill material 206 between the substrate and the semiconductor device, such that said flowable underfill material contacts said applied wetting agent layer 'coupling agent.'" "To further clarify the disclosure of a liquid wetting agent layer 205, as cited, Yamada discloses 'these components being . . . molten . . . was coated on surface of the wiring circuit board . . . thereby forming a second encapsulation resin layer 205.' Furthermore, Yamada discloses 'The coating method of this second encapsulation resin [205] may be arbitrarily selected.' In addition, as cited, Yamada discloses that the disclosure that a coating method of 'encapsulation resin may be arbitrarily selected' includes 'screen printing,' and, screen printing of encapsulation resin inherently requires liquid encapsulation resin."

Appellant also asserts, "[Yamada] does not describe applying a wetting agent or essentially uniform liquid silane-based wetting agent layer having a thickness of about a monolayer to at least one of said surface of said semiconductor device and said surface of said substrate whatsoever.

This assertion is respectfully traversed because Yamada is not necessarily relied on in the rejection for a wetting agent having a thickness of about a monolayer to at least one of said surface of said semiconductor device and said surface of said substrate or an essentially uniform liquid silane-based wetting agent layer having a thickness of about a monolayer to

at least one of said surface of said semiconductor device and said surface of said substrate.

In addition, appellant alleges, "Further, the Examiner admits that Yamada does not explicitly disclose that 'said flowable [underfill] material contacts said [applied] wetting agent layer.' (October 20, 2006, Office Action, page 9-10). Therefore, Yamada et al. al. does not anticipate independent claim 58."

These allegations are respectfully traversed because there is no such admission in the Office action or elsewhere in the record. Instead, the full text of the relevant quote, without appellant's conveniently modified text, is the following: "Also, Yamada and Schultz do not appear to explicitly disclose that said flowable material contacts said **liquid** wetting agent layer [emphasis added]. Further, in the Office action and again *supra*, this quoted passage is directed to claims 1-5, 7-12, 15, 22, 62 and 64, not to claim 58, because the scope of claims 1-5, 7-12, 15, 22, 62 and 64 but not the scope of claim 58 is limited to wherein the flowable material contacts the liquid wetting agent layer while the liquid wetting agent layer remains liquid. On the other hand, the broader scope of claim 58 is limited only to wherein the flowable underfill material contacts said applied wetting agent layer, whether or not the flowable underfill material contacts the applied liquid wetting

agent layer when it is liquid or, as in Yamada, at least after the applied liquid wetting agent layer is solidified.

Appellant also suggests, "Claim 61 is further allowable as Yamada fails to describe, either expressly or inherently, that the wetting agent comprises a silane-based material See, October 20, 2006, Office Action, page 9-10."

This suggestion is respectfully traversed because, as elucidated in the rejection of claim 61, Yamada discloses that the wetting agent comprises silane-based material "silane." Again, the cited passage is not directed to nor relevant to the rejection of claim 61, but rather to claims 1-5, 7-12, 15, 22, 62 and 64 because the scope of claim 61 is broader than the scope of claims 1-5, 7-12, 15, 22, 62 and 64. In particular, the scope of claims 1-5, 7-12, 15, 22, 62 and 64 is limited to wherein the wetting agent *layer comprises a layer* of silane-based material (defined as a silane main [chief, principle] ingredient), whereas the broader scope of claim 61 encompasses wherein the wetting agent layer merely comprises a silane-based material (defined as a silane main [chief, principle] ingredient) but not necessarily a layer of silane-based material (defined as a silane main [chief, principle] ingredient).

Further appellant argues, "Contrary to the Examiner's assertion, Yamada does not teach that the 'underfill material is not limited to thermosetting material,' but rather that the 'resin is not limited to bisphenol

type epoxy resin.' (Cf, October 20, 2006, Office Action, page 9 and Yamada col. 70, lines 8-14 and 62)."

This argument is respectfully traversed because, as cited in the rejection, Yamada discloses, "the encapsulation resin [underfill material] should **preferably** be a thermosetting resin of non-solvent type in general [emphasis added].” Therefore, Yamada discloses that the underfill material is not limited to thermosetting material. Moreover, as cited in the rejection, the underfill material "resin" of claim 1 is not limited to thermosetting material.

Appellant also alleges, "the Yamada et al. reference cannot teach or suggest the use of a thermo-plastic underfill because a thermo-plastic underfill would soften with an increase of temperature when the IC chip is being operated so that the thermo-plastic underfill would be unable to compensate for any thermal mismatch between IC chip and the IC carrier thereby making the Yamada et al. invention inoperable due to the thermo-plastic material loosing its strength as it is heated thereby allowing the IC chip to separate from the substrate as the bump electrodes 203 fail in shear due to the thermo-plastic material carrying no load. Additionally, thermo-plastic materials have too high viscosity to be used as underfill materials as they are unable to effectively fill the small space between an IC chip

mounted on an IC chip carrier using solder balls where the small space is 125 microns or less in height."

These allegations are respectfully deemed unpersuasive because Yamada is not necessarily applied to the rejection to suggest the use of a thermo-plastic underfill. In any case, these allegations are respectfully deemed unpersuasive because they are unsupported by proof or a showing of facts; hence, they essentially amount to mere conjecture and they are of no probative value. See MPEP 716.01(c), and, *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989) (statement in publication dismissing the "preliminary identification of a human b - NGF - like molecule" in the prior art, even if considered to be an expert opinion, was inadequate to overcome the rejection based on that prior art because there was no factual evidence supporting the statement); *In re Beattie*, 974 F.2d 1309, 24 USPQ2d 1040 (Fed. Cir. 1992) (declarations of seven persons skilled in the art offering opinion evidence praising the merits of the claimed invention were found to have little value because of a lack of factual support); *Ex parte George*, 21 USPQ2d 1058 (Bd. Pat. App. & Inter. 1991) (conclusory statements that results were "unexpected," unsupported by objective factual evidence, were considered but were not found to be of substantial evidentiary value).

In addition, appellant asserts, "both the Schulz et al. reference and the Pluddemann reference teaches away from any combination with and modification of the Yamada et al. reference."

This assertion is respectfully deemed unpersuasive and traversed because applicant has not cited any relevant disclosure of Schulz and Pluddemann to support the assertion, and the support for this assertion is not otherwise evident.

Appellant also contends, "one of ordinary skill in the art would not substitute the use of a thermo-plastic for the thermo-setting underfill of Yamada et al."

This contention is respectfully traversed because proper and sufficient rationale to combine the references is elucidated in the rejection.

Appellant further argues, "one of ordinary skill in the art would not substitute either the thermo-plastic resin of the Schultz et al. reference or the liquid primer composition from the Pluddemann reference to be separately applied to the IC chip and/or IC carrier of the Yamada et al. reference."

This argument is respectfully deemed unpersuasive because proper and sufficient rationale to combine the references is elucidated in the rejection. Furthermore it is not necessarily maintained in the rejection that one of ordinary skill in the art would substitute either the thermo-plastic

resin of the Schultz et al. reference or the liquid primer composition from the Pluddemann reference to be separately applied to the IC chip and/or IC carrier of the Yamada et al. reference. For example, Pluddemann is applied, not separately to, but to the combination of Yamada and Schultz.

Appellant also alleges, "The substitution of a thermo-plastic resin of Schultz et al. for a thermo-setting resin of Yamada et al. destroys the Yamada et al. invention as it would fail since in operation, the thermoplastic resin of Schultz et al. would allow the device to separate and the bump electrodes 203 to fail in shear due to the thermo-plastic resin carrying no load."

This allegation is respectfully deemed unpersuasive because it is unsupported by proof or a showing of facts; hence, it essentially amounts to mere conjecture and it is of no probative value.

Additionally, appellant alleges, "the substitution of a liquid primer composition from the Pluddemann reference for a resin of the Yamada et al. reference cannot be the substitution of an equivalent."

This allegation is respectfully deemed unpersuasive because Pluddemann is not necessarily applied to the rejection for the substitution of a liquid primer composition from the Pluddemann reference for a resin of the Yamada et al. reference as a substitution of an equivalent. Instead, Pluddemann is applied because, as elucidated in the rejection, "it would have

been obvious to combine this disclosure of Pluddemann with the disclosure of Yamada and Schultz because it would provide the 'other adhesion assistants' of Yamada having improved wetting to the thermoplastic underfill material of the combination of Yamada and Schultz. Furthermore, the wetting agent layers of Pluddemann and the combination of Yamada and Schultz, including the 'other adhesion assistants' of Yamada in the combination of Yamada and Shultz, are at least alternatives; therefore, as reasoned from well established legal precedent, it would have been obvious to substitute or combine the liquid wetting agent layer of Pluddemann for or with the wetting agent layer of Yamada in the combination of Yamada and Schultz.

Appellant also asserts, "one of ordinary skill in the art would not use the Pluddemann liquid primer composition for use with thermo-setting plastics of Yamada et al."

This assertion is respectfully deemed unpersuasive because, as elucidated in the record, Pluddemann is not necessarily applied to the rejection for a disclosure that one of ordinary skill in the art would use the Pluddemann liquid primer composition for use with thermo-setting plastics of Yamada et al..

Appellant further argues, "the sole teaching or suggestion for the use of a liquid wetting agent on one of the active surface of said semiconductor

device and a portion of said upper surface of said substrate for use with an underfill material is solely the Appellant's disclosure because the cited prior art teaches away from any combination thereof, because if the prior art is combined as suggested in the rejection, the combination clearly destroys the operability of the primary reference and because the cited prior art does not contain any suggestion for any combination thereof. Solely Appellant's disclosure contains any such suggestion as evidenced by the attempt to combine the cited prior art in a rejection which destroys the invention of the Yamada et al. reference."

This argument is respectfully traversed because the allegation, "if the prior art is combined as suggested in the rejection, the combination clearly destroys the operability of the primary reference" is unsupported by proof or a showing of facts; hence, it essentially amounts to mere conjecture and it is of no probative value. Also, the statement, "the cited prior art teaches away from any combination thereof, because if the prior art is combined as suggested in the rejection, the combination clearly destroys the operability of the primary reference and because the cited prior art does not contain any suggestion for any combination thereof" is fallacious because the prior art does not teach away from any combination thereof with a prior art teaching that if the prior art is combined as suggested in the rejection, the combination clearly destroys the operability of the primary reference, and an

alleged lack of the cited prior art to contain any suggestion for any combination thereof would not constitute a teaching away from "any combination thereof." Moreover, in the argument, the allegation that "the cited prior art teaches away from any combination thereof, because if the prior art is combined as suggested in the rejection, the combination clearly destroys the operability of the primary reference," does not support the conclusion that "the sole teaching or suggestion for the use of a liquid wetting agent on one of the active surface of said semiconductor device and a portion of said upper surface of said substrate for use with an underfill material is solely the Appellant's disclosure." In addition, in the argument, the statement, "the cited prior art does not contain any suggestion for any combination thereof," is respectfully deemed unpersuasive and traversed because proper and sufficient rationale, including suggestions contained in the prior art, is provided to combine the applied references. In any case, there is no requirement that the cited prior art contain any suggestion for any combination thereof. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

David E. Graybill



Conferees:

Zandra V. Smith 
Supervisory Patent Examiner


RICKY MACK
SUPERVISORY PATENT EXAMINER